



Researching Technology Enhanced Learning in New Zealand Schools

Two studies in mobile learning

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Some Background

- **Valtech**
- **Vodafone**
- **Valentine...**



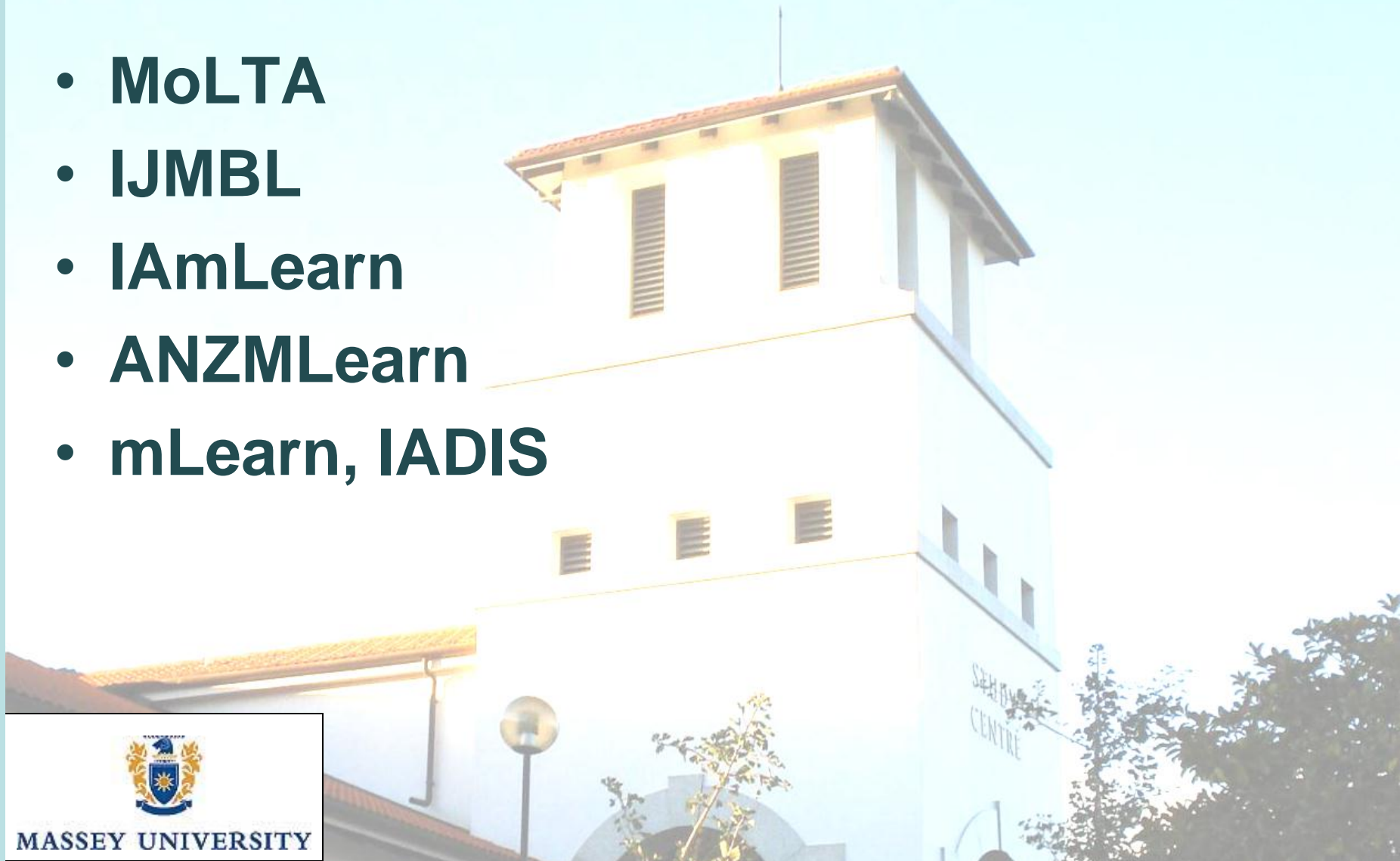
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Since Then

- **MoLTA**
- **IJMBL**
- **IAmLearn**
- **ANZMLearn**
- **mLearn, IADIS**



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Two PhD Studies

- **A longitudinal study of using one-to-one mobile devices for learning at Orewa College**
 - Early stage – Janak Adhikari
- **A mobile learning science enquiry project at Albany Senior High**
 - Late stage – Sohaib Ahmed

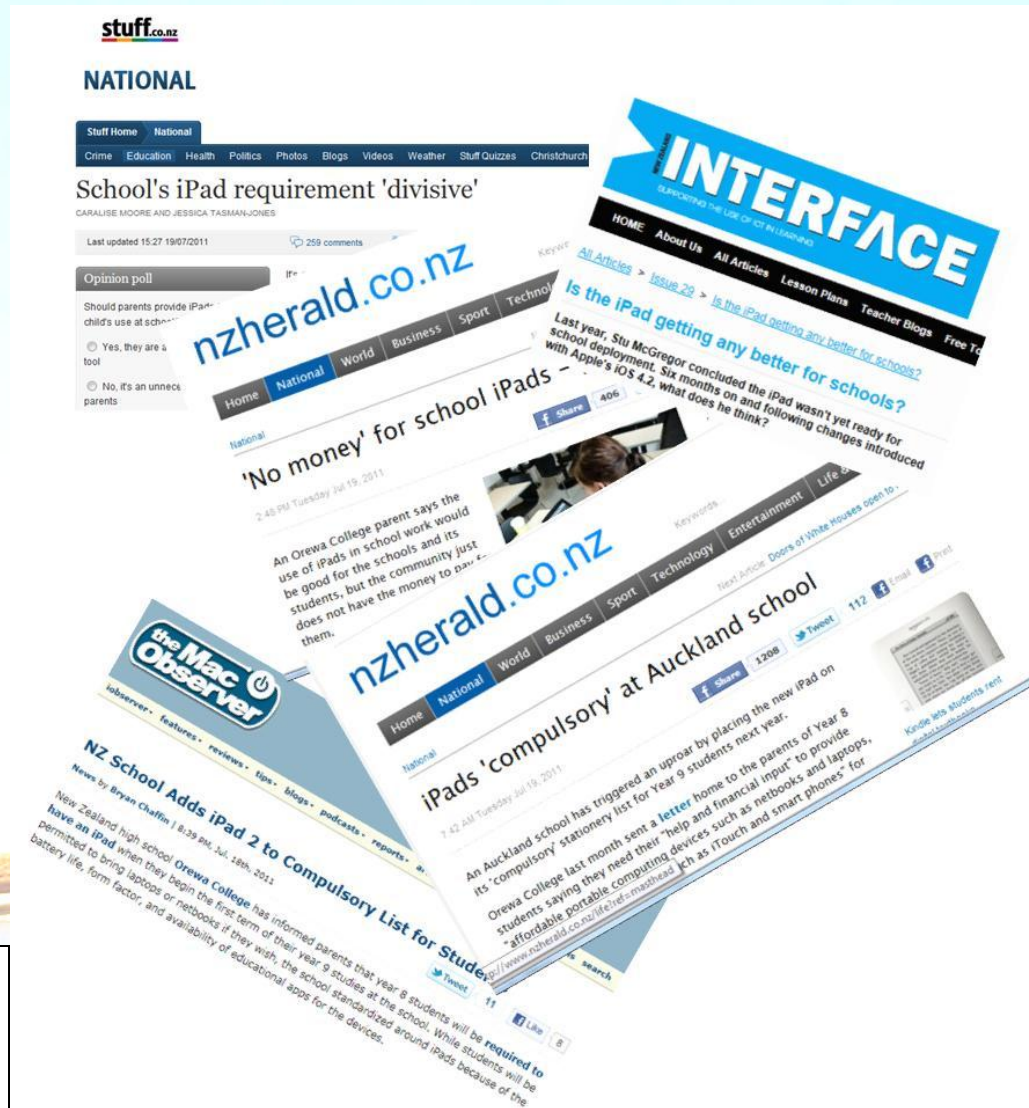


Orewa College

- **Students to have a 1 to 1 digital learning device in the classroom in year 9 (students aged 13-14)**
- **Recommended device: iPad2 (battery life and portability – not apps)**
- **Not supplied by the school**
- **Massey asked to evaluate**



Storm in a Teacup



Source of Public Response Data	Number of Posts in Source
http://www.stuff.co.nz	News + 49 Comments
http://www2.everybody.co.nz	17 Comments
http://www.e-bls.com	News Only
http://edorigami.edublogs.org	News + 5 Comments
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10739485	News Only
http://www.macobserver.com/tmo/article/nz_school_adds_ipad_2_to_compulsory_list_for_students	News + 3 Comments
http://nz.news.yahoo.com/a/-/top-stories/9872475/opposition-to-ipads-in-schools/	News + 104 Comments
http://www.3news.co.nz/Orewa-College-leads-iPad-introduction/tabid/817/articleID/219329/Default.aspx	News + 11 Comments
http://www.3news.co.nz/Orewa-College-leads-iPad-introduction/tabid/817/articleID/219329/Default.aspx	News + 18 Comments
http://www.3news.co.nz/Principals-Assn-weighs-into-iPad-debate/tabid/423/articleID/219385/Default.aspx	News + 10 Comments
http://www.odt.co.nz/news/national/169840/school-ipads-tough-parents-budget-advisors	News + 3 Comments
http://ipadeducators.ning.com/forum/topics/school-s-controversial-decision	News + 2 Comments
http://www.stuff.co.nz/national/education/5304084/Schools-iPad-requirement-divisive	News + 183 Comments
http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10739428#cmnts_Start	News + 45 Comments
http://continue.edublogs.org/2011/07/22/where-are-the-computers/	News + 1 Comment



Public Debate – Key Themes

- ***Financial Aspects***
 - 80% concerned
- ***Choice of Device***
 - 90% who commented against iPad
- ***Possible Challenges***
 - 40% risk, 15% usage
- ***Views on digital learning***
 - 90% positive



Financial Aspects

- **Cannot afford the device**
- **Requirement to buy a device unusual (i.e. no other New Zealand school has done this)**
- **Low income families forced to buy a device they cannot afford, impacting negatively on families and the wider society**



Choice of Device

- **Why has school recommended an expensive brand?**
- **Suitability and usability of the iPad2 as a learning tool**
- **Decision process**

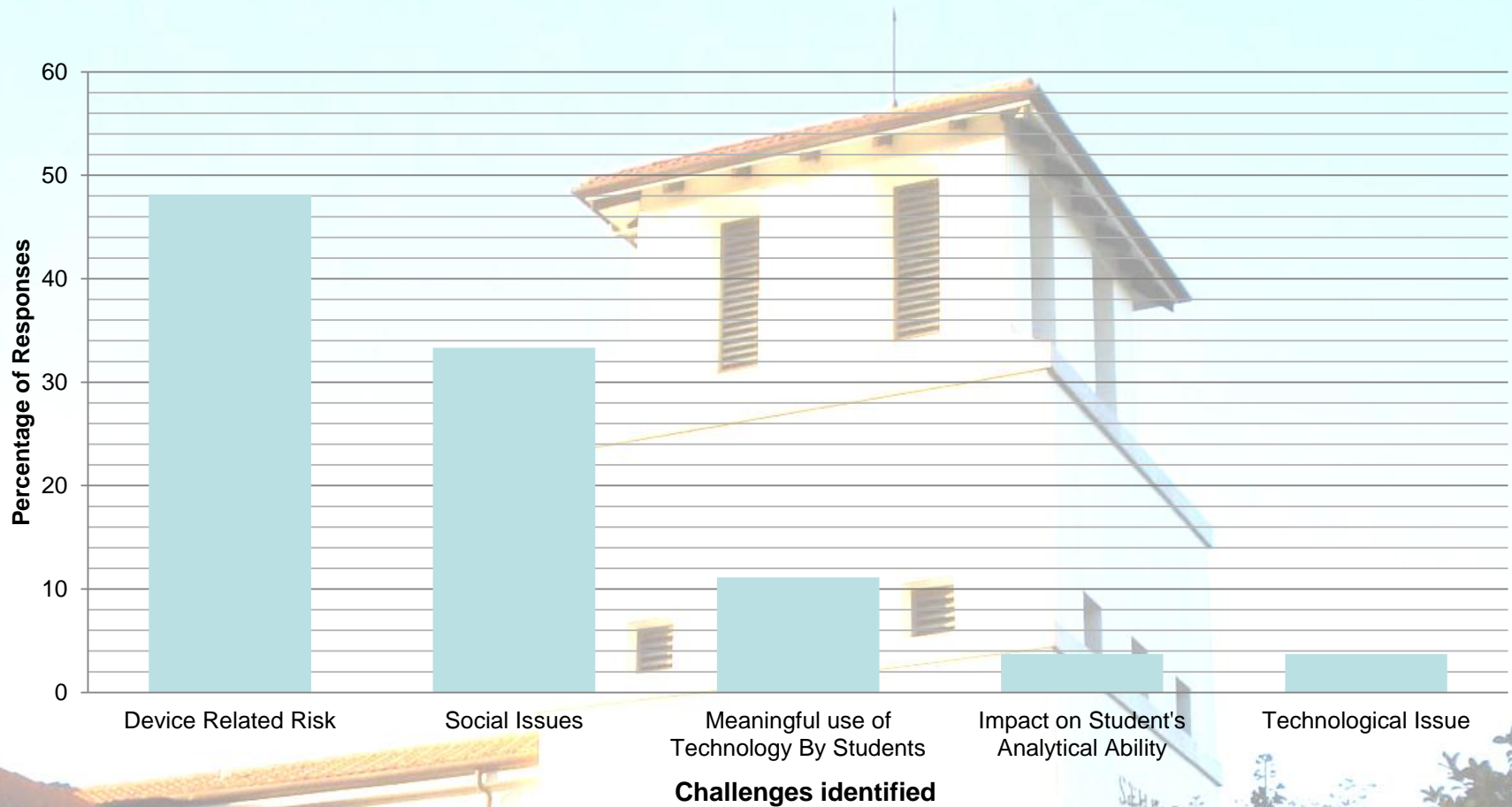


Possible Challenges

- **Potential for loss, theft and damage**
- **Social inequity in terms of device ownership**
- **Meaningful use of the technology**
- **Unsupervised access to resources**
- **Inequality beyond physical access**
- **Destroy the ability to analyse and think creatively**



Main Challenges by %



Views on Digital Learning

- **Integrate technology to assist students both to learn and to improve their analytical skills**
- **Digital learning important for students in 21st century education**
- **Device or technology required should be the responsibility of government**



Ongoing Research

- **Learning process and integration of the technology**
- **Effects of any material divides between the learners**
- **Differences in skills and usage beyond access to devices**
- **Risks (challenges)**
- **Agents of change**



ThinknLearn

- **Final stage of project to apply ontology to mobile learning**
- **Experimental deployment at Albany Senior High**



Ontology

- ***“Ontology is less concerned with what is than with what is possible”***
 - *semanticweb.org*
- **Has a particular meaning in information science**
 - A set of concepts within a domain, and their relationships
 - Can be used to *reason* about these



A Design Science Exploration

- **Iteration 1**
 - Ontology can be used to present questions
- **Iteration 2**
 - Ontology can be used from multiple perspectives
- **Iteration 3**
 - Ontology can be used for enquiry based learning
- **Iteration 3**
 - Evaluating ontology supported learning



Enquiry Based Learning

- Often takes place outside the classroom, or mobile in the classroom
- Tools to learn science by doing science
- To foster learners' motivation and interest
- Problem of incorrectly inferred hypotheses from collected data



Abductive Enquiry

- **School science has traditionally been dominated by the hypothetico-deductive view of science**
- **Abductive enquiry emphasizes the development of hypotheses which can effectively explain observed phenomena**

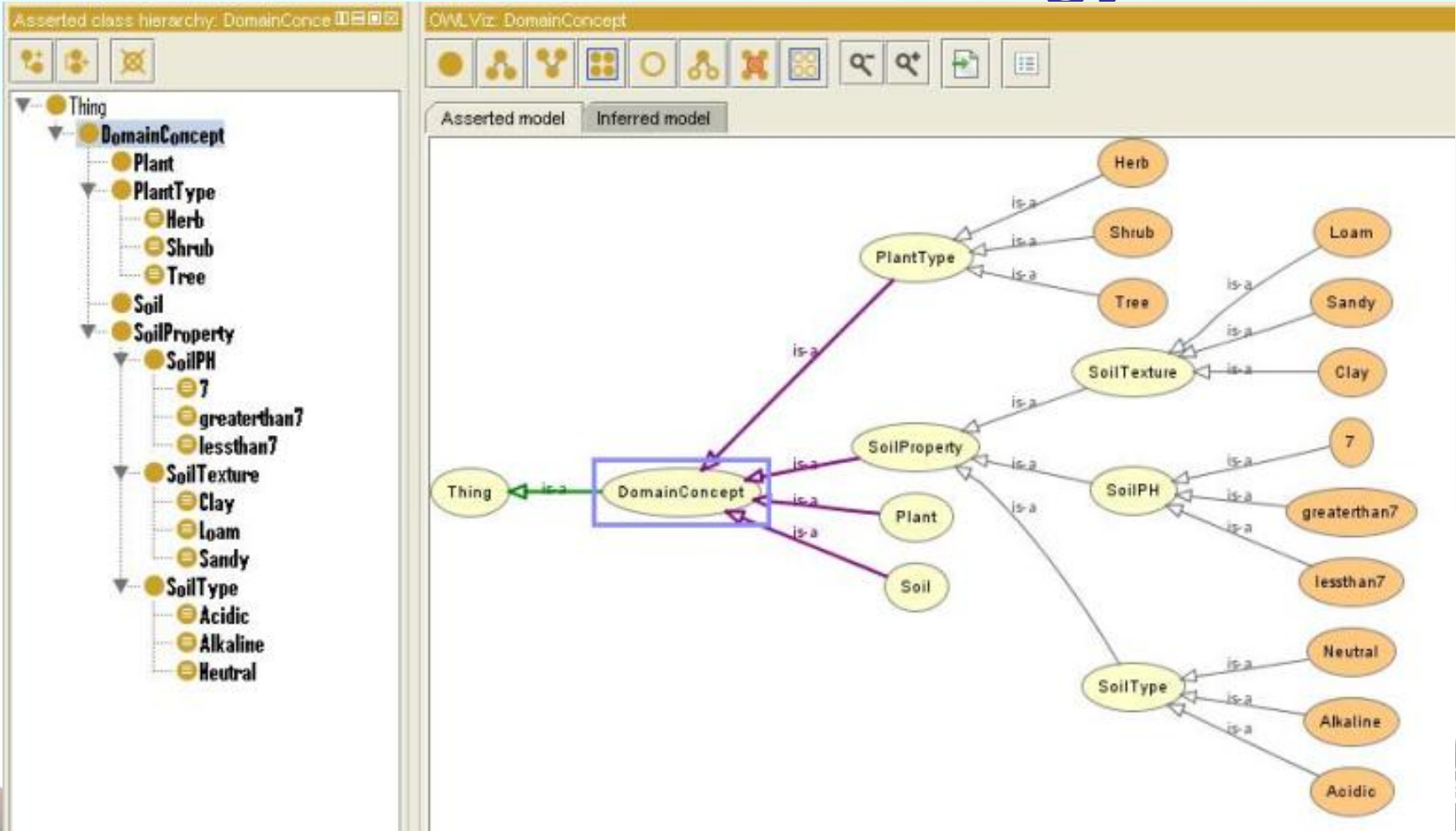


Ontology-driven Application

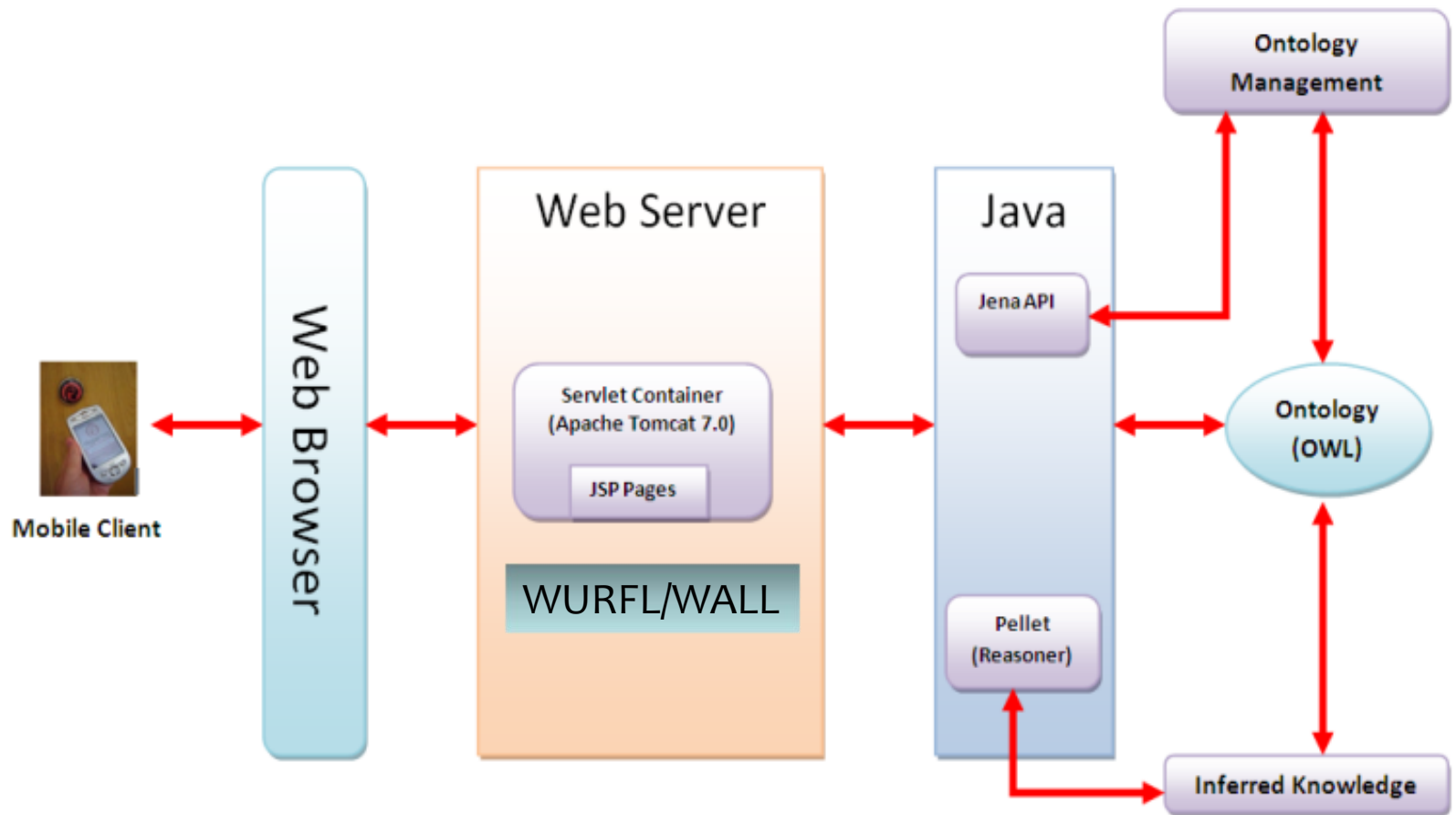
- **Expressiveness**
- **Extensibility**
- **Ease of sharing and reuse**
- **Logic reasoning support**
- **May help us to guide enquiry based learning through inference**



A Domain Ontology



Technical Architecture



The Experiment

- **NCEA Science Level 1**
- **Implications of heat for everyday life**
- **Measuring relative rate of temperature loss comparing colour as an insulator/conductor**



Introduction



Mobile Science Enquiry Based Learning Application

This application is based on the one of the experiments of your science curriculum. You have to perform an experiment by using this application. Multiple choice questions(MCQs) will be asked regarding measurements and observations which were taken during the experiment. Further, this application will give suggestions which may lead you to formulate a hypothesis in the end.



Click to Proceed



The Experiment

In this experiment, three different-surfaced colour tins are provided in order to compare their ability to radiate heat energy between them. Tin A is painted white, tin B black and tin C is silver or shiny. Each tin has a small hole at the top and is filled with water at 100°C . They are placed on a bench and the temperature inside each tin is measured at a particular time.



Click to proceed



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Measurements



Tin A - White-Surfaced



Temperature($^{\circ}\text{C}$)

Select the temperature of the tin: 76-80 ▾

Time (mins)

Select the time at which temperature is taken:

4 ▾

Submit



Tin B - Black-Surfaced



Temperature($^{\circ}\text{C}$)

Select the temperature of the tin: 71-75 ▾

Time (mins)

Select the time at which temperature is taken:

4 ▾

Submit



Tin C - Shiny-Surfaced



Temperature($^{\circ}\text{C}$)

Select the temperature of the tin: 71-75 ▾

Time (mins)

Select the time at which temperature is taken:


4 ▾

Submit



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Questions




Suggestion for Question - 1

ve selected: **Tin B**

stion: Energy particles of **Tin B** will vibrate
han other tins.

[Proceed to next question](#)



Inputs - Tin A

Coloured-surface: **White** Temperature: **76-80⁰C**
Time: **4 mins**

Inputs - Tin B

Coloured-surface: **Black** Temperature: **71-75⁰C**
Time: **4 mins**

Inputs - Tin C


Coloured-surface: **Shiny** Temperature: **71-75⁰C**
Time: **4 mins**

Question

Which tin has the middle temperature range
(higher with one tin and lower with other)?

☐ Tin A ☒ Tin B ☐ Tin C

[Suggestion](#)



Inputs - Tin A

Coloured-surface: **White** Temperature: **76-80⁰C**
Time: **4 mins**

Inputs - Tin B

Coloured-surface: **Black** Temperature: **71-75⁰C**
Time: **4 mins**

Inputs - Tin C


Coloured-surface: **Shiny** Temperature: **71-75⁰C**
Time: **4 mins**

Question

Which coloured-surface lose heat energy slowly?

☒ White ☐ Black ☐ Shiny

[Suggestion](#)




Suggestion for Question - 2

You have selected: **White**

Suggestion: A **White** -surfaced tin can have
higher heat capacity than warmer tin and lower
heat capacity than other cooler tin .

[Proceed to next question](#)



Inputs - Tin A

Coloured-surface: **White** Temperature: **76-80⁰C**
Time: **4 mins**

Inputs - Tin B

Coloured-surface: **Black** Temperature: **71-75⁰C**
Time: **4 mins**

Inputs - Tin C


Coloured-surface: **Shiny** Temperature: **71-75⁰C**
Time: **4 mins**

Question

Which coloured-surface will reach room
temperature (20⁰C) first?

☐ White ☐ Black ☒ Shiny

[Suggestion](#)



Suggestion for Question - 3

You have selected: **Shiny**

Suggestion: A **Shiny** -surfaced tin can lose heat
energy slower than other tins.

[Proceed to Summary](#)



Summary and Hypothesis



Summary - Experiment

Inputs - Tin A

Coloured-surface: **White** Temperature: **76-80 °C**
Time: **4 mins**

Inputs - Tin B

Coloured-surface: **Black** Temperature: **71-75 °C**
Time: **4 mins**

Inputs - Tin C

Coloured-surface: **Shiny** Temperature: **71-75 °C**
Time: **4 mins**

Suggestions

- Energy particles of Tin B will vibrate faster than other tins.
- A White -surfaced tin can have higher heat capacity than warmer tin and lower heat capacity than other cooler tin.
- A Shiny -surfaced tin can lose heat energy slower than other tins.

Generate Hypothesis



Select Hypothesis

- ☐ Energy particles in a White-surfaced tin vibrate more faster than other tins because it has medium heat capacity and lose heat energy slower than other warmer tin and quicker than other cooler tin
- ☐ Energy particles in a Shiny-surfaced tin vibrate more slower than other tins because it has medium heat capacity and lose heat energy slower than other warmer tin and quicker than other cooler tin
- ☒ Energy particles in a Black-surfaced tin vibrate more faster than other warmer tin and slower than other cooler tin because it has lower heat capacity and lose heat energy slower than other tins
- ☐ Energy particles in a Black-surfaced tin vibrate more faster than other tins because it has higher heat capacity and lose heat energy quicker than other tins

Result



Result

Sorry! Your hypothesis is incorrect.

The correct hypothesis could be: Energy particles in a Black-surfaced tin vibrate more faster than other tins because it has higher heat capacity and lose heat energy quicker than other tins



- **The end...**



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